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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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09/747,667

12/22/2000

Jeng H. Hwang

5256 USA
02/ETCH/METAL

9828

32588 7590 05/23/2003

APPLIED MATERIALS, INC.
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SANTA CLARA, CA 95050

EXAMINER

AHMED, SHAMIM

ART UNIT

PAPER NUMBER

1765

DATE MAILED: 05/23/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/747,667

Applicant(s)

HWANG ET AL.

Examiner

Shamim Ahmed

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 March 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-57 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-57 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Terminal Disclaimer

1. The terminal disclaimer filed on 12/11/02 disclaiming the terminal portion of any patent granted on this application, which would extend beyond the expiration date of US serial No. 09/747,652 has been reviewed and is accepted. The terminal disclaimer has been recorded.

Accordingly, the double patenting rejection of the previous office action mailed 9/11/02 is withdrawn.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hwang et al (6,323,132) in view of Bedi et al (6,094,334).

Hwang et al disclose an etching process for a metal-containing layer such as platinum, iridium or ruthenium, wherein the substrate is preheated to a temperature at least 150⁰ C and etching the metal-containing layer with a plasma of an etchant gas comprising nitrogen (col.6, lines 6-15, col.8, lines 1-10). Hwang et al also disclose that the plasma gas comprises oxygen (col.11, lines 36-51 and col.13, lines 5-14).

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As to claims 2 and 5, Hwang et al teach that the plasma source gas comprises nitrogen during platinum layer and can be present in a range of 10-80% by volume (col.10, lines 43-48).

Therefore, the first and second source gas is the same gas source as taught by Hwang et al.

As to claims 32 and 55-57, Hwang et al teach that the plasma source gas may includes an inert, non-reactive gas such as helium, neon or argon (col.24, lines 53-60).

Hwang et al do not explicitly disclose that the substrate is exposed to preheating plasma.

However, Bedi et al teach that a substrate is heated to about 100 to about 250 degree C by plasma itself (col.5, lines 6-13 and lines 23-25) to facilitate the etching of high conductive metals such as platinum.

Therefore, it would have been obvious to one skilled in the art at the time of claimed invention to combine Bedi et al's teaching into Hwang et al's process by heating the substrate at least 150 degree C by exposing the substrate to a plasma because plasma itself will heat the substrate as taught by Bedi et al.

Response to Arguments

4. Applicant's arguments filed 3/19/03 have been fully considered but they are not persuasive. Applicants argue that Hwang et al do not teach that the substrate is preheated by plasma and also states that the substrate is preheated by using heat exchanger.

In response, examiner states that it is true that Hwang et al do not teach that the substrate is exposed to pre-heating plasma but it would have been obvious to pre-heat the substrate with the plasma, which is used to etch the metal layer because plasma it self heat the substrate to a rang of about 100 to about 250 degree C as supported by Bedi et al.

Applicants also argue that Bedi et al actually teaches away from the plasma heating.

This is not persuasive because Bedi et al teach that the plasma it self can preheat the substrate to about 100 to about 250 degree C and then the temperature can be raised by a suitable heater to achieve the desired temperature of 250 to 400 degree C (col.5, lines 23-27).

So, Bedi et al clearly teach that the substrate is preheated upto 250 degree C by plasma heating.

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Athavale et al (U S publication NO. 2001/0053610 A1) disclose a method of plasma etching of metal such as platinum, wherein plasma preheated the substrate above 200 degree C and simultaneously etch the metal layer without using a high temperature wafer electrode (see paragraph 0027 at page 2).


6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shamim Ahmed whose telephone number is (703) 305-1929. The examiner can normally be reached on M-Thu (7:00-5:30) Every Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin Utech can be reached on (703) 308-3836. The fax phone numbers for the organization where this application or proceeding is assigned are (703)-872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.


BENJAMIN L. UTECH
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700

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Shamim Ahmed
Examiner
Art Unit 1765

SA
May 21, 2003